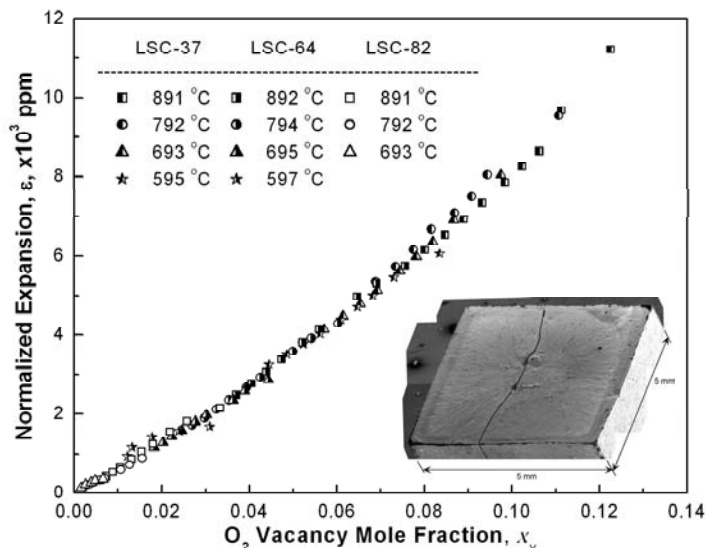


# Chemical Expansion of Mixed-Conducting Ceramics

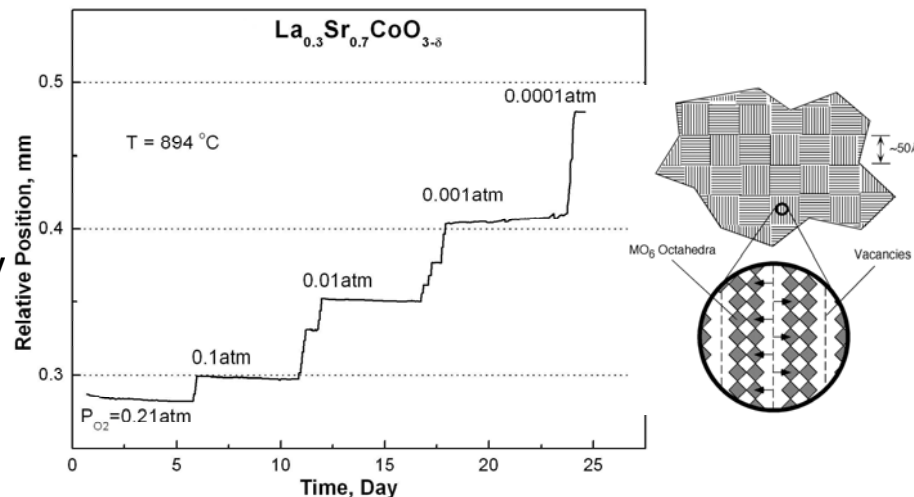
Xiyong Chen, Jinsong Yu, and Stuart B Adler

University of Washington, DMR-0222001



Mixed conducting ceramics, often used in high-temperature fuel cells or membranes, expand when exposed to a reducing environment, with significant implications for performance and manufacturability. We have measured this effect in a large number of perovskites, and shown them to behave similarly over a wide range of conditions (see figure at left).

We have also discovered a much slower expansion of the lattice volume following changes in oxygen partial pressure near a phase transition. Such effects are undetectable by in-situ X-ray diffraction. We currently believe this effect results from nano-scale cation defect ordering processes.



# Chemical Expansion of Mixed-Conducting Ceramics

Stuart B, Adler, University of Washington, DMR-0222001

## Education:

To date this project has involved one MS student (Jinsong Yu), one PhD student (Xiyong Chen) and one undergraduate (Ryan Reed). Jinsong, a student at Case Western Reserve University graduated with his MS and is now pursuing a PhD in Materials Science. Xiyong Chen is in his 4th year. This project has produced 3 papers to date, with one in preparation. The results of this work have also directly benefited the PI's instructional education program, which includes a popular internet-based distance-learning course on Solid Oxide Fuel Cells. The results have also benefited the PI's DOE-sponsored research program on SOFC electrodes, which has direct ties to national lab and industrial fuel cell development.

## Outreach:

PI Stuart Adler and his students participate actively in educational outreach. Dr. Adler was the organizer for the 2002 Chemical Engineering open house at UW, which hosted approximately 3000 Seattle-area elementary and high school students.



*Lisa Fay-Lucas demonstrates properties of liquid nitrogen as she makes ice cream and tries to keep up with the demand.*